

Dear Prof. He,

Thank you for your careful reading and constructive feedback. We are pleased that you found our responses to the reviewers' comments adequate. Below we address your two clarification points.

Regarding your suggestion on regional pre-training followed by limited subbasin fine-tuning, we have added the following statement in the future work section of the conclusion noting that the regional LSTM-GNN framework could serve as a pre-trained model, which may subsequently be fine-tuned for specific subbasins (few-shot/local adaptation). We explicitly link this to improving transferability across basins and better capturing unique catchment dynamics.

Added text to manuscript:

*"Future work could also investigate transfer-learning strategies such as regional pre-training followed by limited subbasin fine-tuning, which may improve performance in hydrological outliers and enhance model transferability to unseen basins."*

Concerning your second question, we confirm that the baseline LSTM-only model is also trained as a regional model. Specifically, the baseline consists of a single LSTM architecture with one shared set of trainable weight matrices and bias vectors that is applied across all 530 subbasins. Each subbasin provides its own meteorological forcing time series and static attributes, but the LSTM parameters are identical across basins and are optimized jointly using the aggregated loss across all subbasins. In other words, the baseline LSTM is not trained as separate independent catchment-specific models, and it does not use subbasin-specific parameterization. This ensures that the baseline comparison is methodologically consistent with the LSTM component of the LSTM-GNN framework, and that the only architectural difference between the two approaches is the inclusion of explicit graph-based routing.

We believe these clarifications address your concerns.

On behalf of the authors,

Hamidreza Mosaffa